THAMES VALLEY

ARCHAEOLOGICAL

SERVICES

Banner Field, Wanborough, Swindon, Wiltshire

Geophysical Survey (Magnetic)

by Kyle Beaverstock

Site Code: BFW18/207

(SU 2157 8316)

Banner Field, Wanborough, Swindon, Wiltshire

Geophysical Survey (Magnetic) Report

For Sun Design and Consultancy

by Kyle Beaverstock

Thames Valley Archaeological Services Ltd

Site Code BFW 18/207

January 2019

Summary

Site name: Banner Field, Wanborough, Swindon, Wiltshire

Grid reference: SU 2157 8316

Site activity: Magnetometer survey

Date and duration of project: 4th - 10th of January 2019

Project coordinator: Tim Dawson

Site supervisor: Kyle Beaverstock

Site code: BFW18/207

Area of site: c. 0.4ha

Summary of results: No magnetic anomalies indicative of possible archaeological features were detected over the course of the survey.

Location of archive: The archive is presently held at Thames Valley Archaeological Services, Reading in accordance with TVAS digital archiving policies.

Report edited/checked by:	Steve Ford✓ 14.1.19
	Tim Dawson✓ 14.1.19

Thames Valley Archaeological Services Ltd, 47–49 De Beauvoir Road, Reading RG1 5NR
Tel. (0118) 926 0552; Email: tvas@tvas.co.uk; Website: www.tvas.co.uk

Banner Field, High Street, Wanborough, Swindon, Wiltshire
A Geophysical Survey (Magnetic)

by Kyle Beaverstock

Report 18/207

Introduction

This report documents the results of a geophysical survey (magnetic) carried out at Banner Field, High Street, Wanborough, Swindon, Wiltshire (SU 2157 8316) (Fig. 1). The work was commissioned by Mr Rob Spurr of Sun Design and Consultancy Ltd., Southview, 22 Ham Road, Wanborough, Swindon, Wiltshire, SN4 0DF.

Planning permission is to be sought from Swindon Borough Council to construct new housing and attenuation pond. A geophysical survey was proposed and would be used to target later trenching. This is in accordance with the Department for Communities and Local Government's National Planning Policy Framework (NPPF 2012) and the Borough's policies on archaeology. The field investigation was carried out to a specification approved by Melanie Pomeroy-Kellinger, County Archaeologist for Wiltshire County Council. The fieldwork was undertaken by Kyle Beaverstock, Kayce Herrick and Benedikt Tebbit, on the 4th and 10th of January 2019 and the site code is BFW 18/207.

The archive is presently held at Thames Valley Archaeological Services, Reading in accordance with TVAS digital archiving policies.

Location, topography and geology

The site is located to the east of Wanborough, at the junction between Wanborough Road and High Street on the edge of the North Wessex Downs (Fig. 2). The site boundary lies within an irregular parcel of land which slopes from 146m above Ordinance Datum (aOD) in the south-east downhill to 136m aOD in the north-west. The underlying geology is stated as Head deposits (BGS 1974).

Site history and archaeological background

The site lies on the edge of the historic (Saxon/medieval) core of Wanborough village which is mentioned in the Domesday Book of 1086 (Williams and Martin 2002). Although it lies well to the north of the proposal site there is the presence of a Roman town (Durocornovium) from which a Roman road, now High Street, Wanborough, links *Durocornovium* to *Calleva Atrebartum* (Silchester) and therefore there is the possibility of further Roman roadside settlement or other occupational and agricultural deposits or features being present.

Methodology

Sample interval

Data collection involved the traversing of the survey area along straight and parallel lines using two cart-mounted Bartington Grad601-2 fluxgate gradiometers. Even coverage was achieved with the use of regularly spaced markers at the ends of traverses and the real-time positional trace plot. Readings were taken at 0.25m intervals along traverses 1m apart, providing an appropriate methodology balancing cost and time with resolution. Traverses were walked at an alternating north-west to south-east zig-zag orientation across the survey area. The site had no significant obstructions although a caravan and other ferrous objects were present along the south-western boundary. Conditions during the survey were cold and dry.

The Grad 601-2 has a typical depth of penetration of 0.5m to 1.0m. This would be increased if strongly magnetic objects have been buried in the site. Under normal operating conditions it can be expected to identify buried features >0.5m in diameter. Features which can be detected include disturbed soil, such as the fill of a ditch, structures that have been heated to high temperatures (magnetic thermoremnance) and objects made from ferro-magnetic materials. The strength of the magnetic field is measured in nano Tesla (nT), equivalent to 10^{-9} Tesla, the SI unit of magnetic flux density.

Equipment

The purpose of the survey was to identify geophysical anomalies that may be archaeological in origin in order to inform a targeted archaeological investigation of the site prior to development. The survey and report generally follow the recommendations and standards set out by both English Heritage as published by the European Archaeological Council (EAC 2015) and the Chartered Institute *for* Archaeologists (2002, 2014).

Magnetometry was chosen as a survey method as it offers the most rapid ground coverage and responds to a wide range of anomalies caused by past human activity. These properties make it ideal for the fast yet detailed surveying of an area.

The detailed magnetometry survey was carried out using two dual sensor Bartington Instruments Grad 601-2 fluxgate gradiometers mounted upon a Bartington non-magnetic cart. A two-wheeled lightweight structure pushed by hand, the cart consisted a bank of four vertically-mounted Bartington Grad601-2 magnetic sensor tubes at 1m apart and a Trimble Geo 7x centimetre edition GPS. Readings were collected by two Bartington Grad601-2 loggers and collated using MLgrad601 software on a Linx 12x64 tablet running Windows 10

mounted at the rear of the cart. This enables readings to be taken of both the general background magnetic field and any localised anomalies with the difference being plotted as either positive or negative buried features. All sensors are calibrated to cancel out the local magnetic field and react only to anomalies above or below this base line. On this basis, strong magnetic anomalies such as burnt features (kilns and hearths) will give a high response as will buried ferrous objects. More subtle anomalies such as pits and ditches can be seen from their infilling soils containing higher proportions of humic material, rich in ferrous oxides, compared to the undisturbed subsoil. This will stand out in relation to the background magnetic readings and appear in plan following the course of a linear feature or within a discrete area.

The Trimble Geo7x centimetre edition GPS system with centimetre real-time accuracy was used to tie the cart traverses into the Ordnance Survey national grid. This unit offers both real-time correction and post-survey processing; enabling a high level of accuracy to be obtained both in the field and in the final post-processed data.

Data gathered in the field was processed using the TerraSurveyor software package. This allows the survey data to be collated and manipulated to enhance the visibility of anomalies, particularly those likely to be of archaeological origin. The table below lists the processes applied to this survey, full survey and data information is recorded in Appendix 1.

Process	**Effect**
Clip from -4.8 to5.2nT	Enhance the contrast of the image to improve the appearance of possible archaeological anomalies.
De-stripe: median, all sensors	Removes the striping effect caused by differences in sensor calibration, enhancing the visibility of potential archaeological anomalies.
De-spike: threshold 1, window size 3×3	Compresses outlying magnetic points caused by interference of metal objects within the survey area.

The raw data plot is presented as a greyscale plot shown in relation to the site (Fig. 2) with the processed data then presented as a second figure (Fig. 3), followed by a third plan to present the abstraction and interpretation of the magnetic anomalies (Fig. 4). Anomalies are shown as colour-coded lines, points and polygons.

The greyscale plot of the processed data is exported from TerraSurveyor in a georeferenced portable network graphics (.PNG) format, a raster image format chosen for its lossless data compression and support for transparent pixels, enabling it to easily be overlaid onto an existing site plan. The data plot is combined with grid and site plans in QGIS 3.4.2 and exported again in .PNG format in order to present them in figure templates in Adobe InDesign CS5.5, creating .INDD file formats. Once the figures are finalised they are exported in .PDF format for inclusion within the finished report.

Results

The most significant anomaly detected was a dipolar linear running south-east to north-west and an intermittent dipolar anomaly running north to south. These anomalies are most likely the result of buried services known to cross the site. In the south-east there is a patch of magnetic disturbance that is most likely being caused by a caravan sited along the boundary. Across the site there were a number of dipolar magnetic spikes which a likely the result of buried ferrous objects. No magnetic anomalies which indicated the presence of buried archaeological features were identified.

Conclusion

Although no magnetic anomalies of archaeological significance were detected there was significant magnetic disturbance from buried services. Although it is unlikely this disturbance may be masking the presence of features in some areas of the site.

References

BGS, 1974, *British Geological Survey*, 1:50,000, Sheet 252, Solid and Drift Edition, Keyworth

CI*f*A, 2002, *The Use of Geophysical Techniques in Archaeological Evaluation*, IFA Paper No. 6, Reading

CI*f*A, 2014, *Standard and Guidance: for archaeological geophysical survey*, Reading

EAC, 2015, *EAC Guidelines for the use of Geophysics in Archaeology: Questions to Ask and Points to Consider*, EAC Guidelines 2, Namur

English Heritage, 2008, *Geophysical Survey in Archaeological Field Evaluation*, English Heritage, Portsmouth (2nd edn)

NPPF, 2012, *National Planning Policy Framework*, Dept Communities and Local Government, London

Williams, A and Martin, G H, 2002, *Domesday Book, a complete translation,* London

Appendix 1. **Survey and data information**

Programme:
Name: TerraSurveyor
Version: 3.0.25.0

Raw data
Filename: wanborough.xcp
Instrument Type: MLgrad601 import
Units:
UTM Zone: 30U
Survey corner coordinates (X/Y):
Northwest corner: 590755.670293073, 5711484.48627051 m
Southeast corner: 590830.940293073, 5711410.77627051 m
Direction of 1st Traverse: 90 deg
Collection Method: Parallel
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32702

Source GPS Points: 6719

Dimensions
Composite Size (readings): 579 x 567
Survey Size (meters): 75.3 m x 73.7 m
Grid Size: 75.3 m x 73.7 m
X Interval: 0.13 m
Y Interval: 0.13 m

Stats
Max: 102.52
Min: -100.77
Std Dev: 14.50
Mean: 6.74
Median: 3.62
Composite Area: 0.55482 ha
Surveyed Area: 0.24959 ha

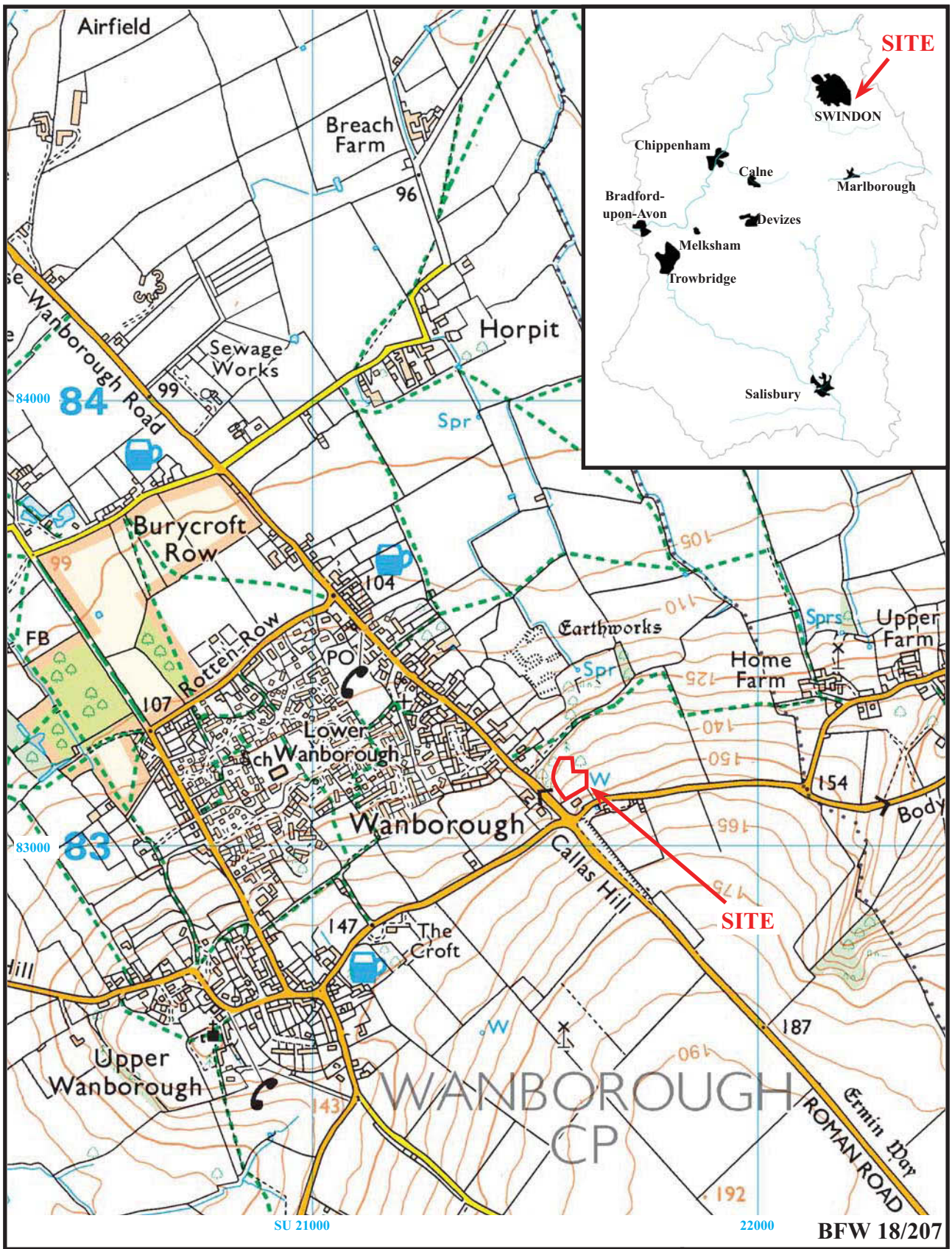
Filename: wanborough 10-1-18.xcp
Instrument Type: MLgrad601 import
Units:
UTM Zone: 30U
Survey corner coordinates (X/Y):
Northwest corner: 590767.449125634, 5711535.48567993 m
Southeast corner: 590879.769125634, 5711420.04567993 m
Direction of 1st Traverse: 90 deg
Collection Method: Parallel
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32702

Source GPS Points: 18911

Dimensions
Composite Size (readings): 864 x 888
Survey Size (meters): 112 m x 115 m
Grid Size: 112 m x 115 m
X Interval: 0.13 m
Y Interval: 0.13 m

Stats
Max: 106.39
Min: -109.70
Std Dev: 19.23
Mean: 1.45
Median: 2.66
Composite Area: 1.2966 ha
Surveyed Area: 0.64113 ha

Processed data
GPS based Processes 5
1 Base Layer.
2 Unit Conversion Layer (Lat/Long to UTM).
3 DeStripe Median Traverse:
4 Despike Threshold: 1 Window dia: 3
5 Clip from -4.8 to 5.2



BFW 18/207

Banner Field, Wanborough,
Swindon, Wiltshire, 2019
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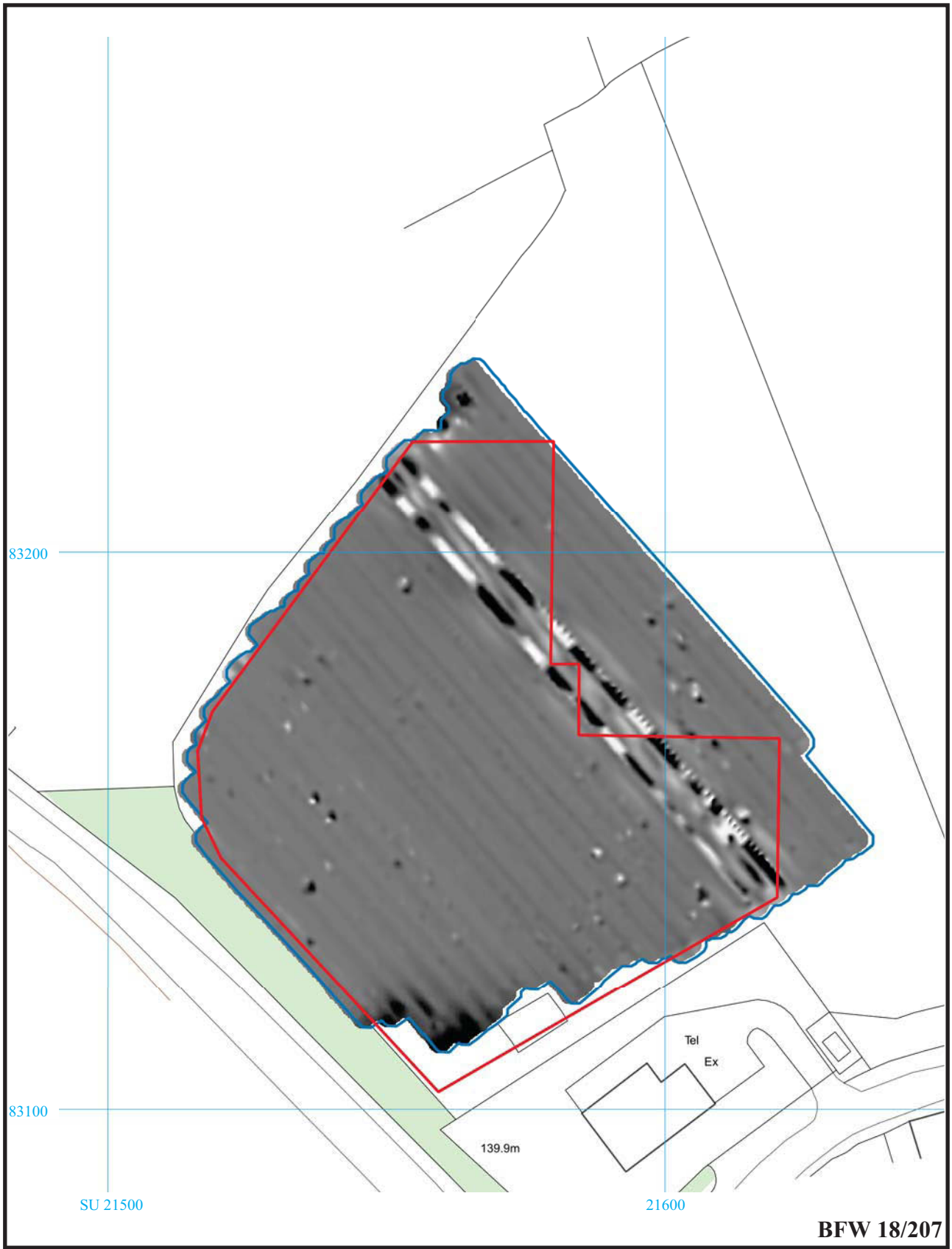
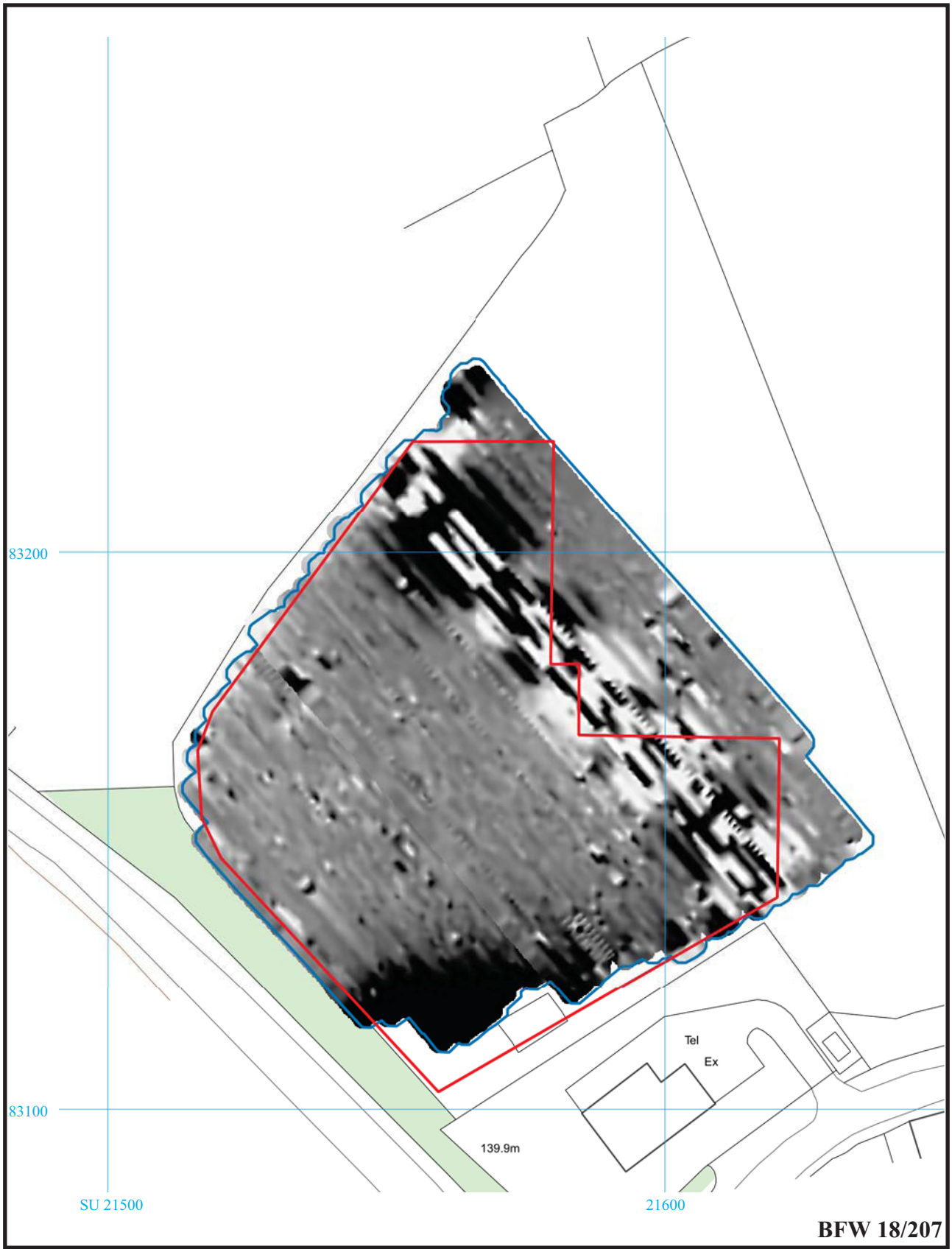
Figure 1. Location of site within Wanborough and Wiltshire.

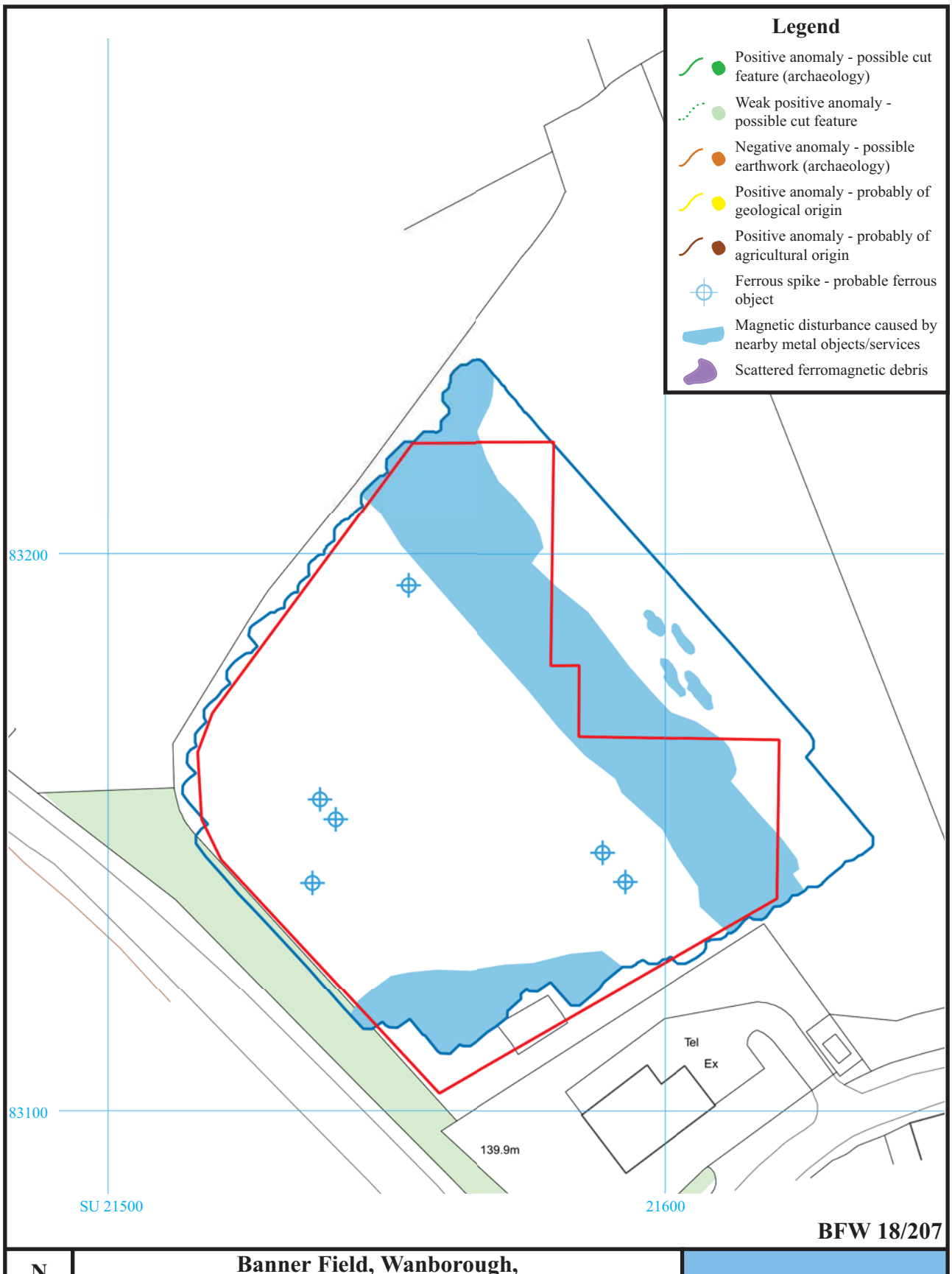
THAMES VALLEY ARCHAEOLOGICAL SERVICES



Banner Field, Wanborough,
Swindon, Wiltshire, 2019
Geophysical Survey (Magnetic)
Figure 2. Plot of raw gradiometer data.



Banner Field, Wanborough,
Swindon, Wiltshire, 2019
Geophysical Survey (Magnetic)
Figure 3. Plot of raw gradiometer data.



Banner Field, Wanborough, Swindon, Wiltshire, 2019
Geophysical Survey (Magnetic)
Figure 4. Interpretation plot.

THAMES VALLEY ARCHAEOLOGICAL SERVICES

Plate 1. Southern end of site looking north-west from site entrance.

Plate 2. Facing south-west along southern boundary.

Plate 3. Northwestern end of field facing west.

BFW 18/207

Banner Field, Wanborough,
Swindon, Wiltshire
Geophysical Survey (Magnetic)
Plates 1 to 3.

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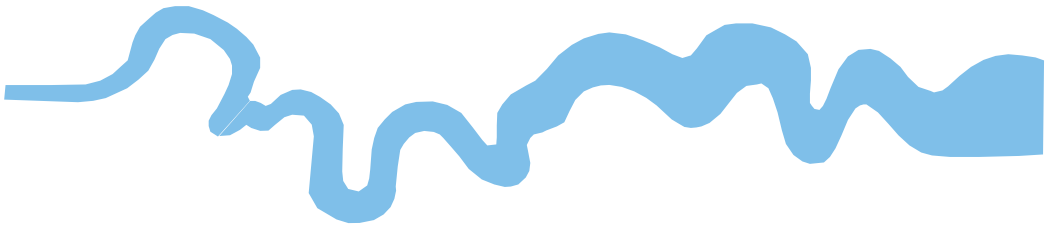
TIME CHART

	Calendar Years
Modern	AD 1901
Victorian	AD 1837
Post Medieval	AD 1500
Medieval	AD 1066
Saxon	AD 410
Roman	AD 43
	AD 0 BC
Iron Age	750 BC
Bronze Age: Late	1300 BC
Bronze Age: Middle	1700 BC
Bronze Age: Early	2100 BC
Neolithic: Late	3300 BC
Neolithic: Early	4300 BC
Mesolithic: Late	6000 BC
Mesolithic: Early	10000 BC
Palaeolithic: Upper	30000 BC
Palaeolithic: Middle	70000 BC
Palaeolithic: Lower	2,000,000 BC



Thames Valley Archaeological Services Ltd,
47-49 De Beauvoir Road,
Reading RG1 5NR

Tel: 0118 9260552
Email: tvas@tvas.co.uk
Web: www.tvas.co.uk

Offices in:
Brighton, Taunton, Stoke-on-Trent and Ennis (Ireland)